

[WO 2005/007405]

[PCT/EP2004/051188]



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**BERNARD ET AL. W1.2343 PCT-US**

**[Specification]**

**DEVICE AND METHODS FOR RAISING AND/OR LOWERING A PRINTING  
FORM**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

**[001]**      This patent application is the U.S. national phase, under 35 USC 371, of PCT/EP2004/051188 filed June 22, 2004; published as WO 2005/007405 A2 on January 27, 2005 and claiming priority to DE 103 31 595.0, filed July 11, 2003 and to DE 10 2004 022 866.3 filed May 6, 2004, the disclosures of which are expressly incorporated herein by reference.

**FIELD OF THE INVENTION**

**[002]**      The present invention is directed[relates] to devices and to methods for drawing-on and/or removing a printing forme[ in accordance with claim 1 or 4 or 22, 27 or 28]. The device includes a storage device which has a dressing receiving chute, a dressing feeding chute and at least one dressing transport device in the storage device.

### **BACKGROUND OF THE INVENTION**

[003] A plate changing device is known from EP 1 084 839 A1, which plate changing device has a pivotable magazine with a feed chute and a receiving chute, a pivotable guidance device, as well as a contact roller, which can be brought in or out of contact. Each chute has a carriage with a hook, by the use[means] of which, the printing forme to be removed is maintained in a one-sided positive contact and is pulled into the chute, or is guided toward the cylinder. The path of the printing forme between the cylinder and the respective magazine chute is determined by pivoting the guidance device.

### **SUMMARY OF THE INVENTION**

[004] It is the object of the present invention to provide[create] methods and devices for drawing-on and/or removing a printing forme.

[005] In accordance with the present invention, the object is attained by the provision of a storage device which has a plate or dressing receiving chute and a plate or dressing feeding chute. At least one transport device is provided for conveying a dressing in the storage device. The transport device is assigned to

both of the chutes and includes a holding assembly. The holding assembly is fixed to the frame with respect to the storage device and is assigned to both of the chutes[means of the characteristics of claim 1 or 4 or 22, 27 or 28].

[006] A substantial advantage<sub>1</sub> which can be achieved by use[means] of the present invention<sub>1</sub> consists in that a rapid and dependable system for drawing-on and/or removing a printing forme is provided[created] with the least possible outlay of funds and space.

[007] By [means of ]the advantageous embodiment of the present invention as a two-part system<sub>1</sub> with a semi-automatic device and a magazine, it is possible to select the degree of automation of the device as a function of the requirements of the particular application.

[008] Because of the connection with the plates or dressing, and[ -] in particular the frictional, or the positive connection on both sides, [connection - ]the employment of the present invention is freely possible in connection with lower or upper printing groups of identical configuration[design], without the need of taking gravity into consideration. Here, an effective connection on both sides is to be

understood as a connection which is stressed for tension and traction with[in] regard to the plate or dressing conveying direction in the longitudinal direction of the chute.

[009] In comparison with prior art devices which utilize two carriages with two drive mechanisms, the employment of only one movable carriage for use with both the feeding chute, as well as with the receiving chute, lowers the costs, the maintenance outlay and the chance of a breakdown.

[010] In contrast to a positive connection of the holding assembly to the plate or dressing, a frictional connection between the holding assembly[means] and the printing forme makes possible<sub>1</sub> in a simple manner<sub>1</sub> the use of printing forms of various formats, without a fresh adjustment and/or additional recesses, hooks, stops or the like being required. The rear end of the magazine, which is embodied in the form of an open quiver<sub>1</sub> is of particular advantage in view of its utilization with printing formes of different lengths.

[011] A movable flap, which is arranged directly on the magazine and which is usable for selecting the chute and/or for the guidance of the printing forme<sub>1</sub>

reduces the capital outlay required, in comparison with an otherwise additional device to be provided. The flap[, and] simultaneously always assures a correct relative position between the magazine chute and the flap.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[012] Preferred[Exemplary] embodiments of the present invention are represented in the drawings and will be described in greater detail in what follows.

[013] Shown are in:

Fig. 1, a schematic side elevation view[an overview] of a printing press, in

Fig. 2, a schematic top plan representation of webs of different width, in

Fig. 3, a schematic side elevation view of a printing unit, in

Fig. 4, a side elevation view of a first preferred embodiment of a semi-automatic device with associated magazine, in

Fig. 5, a perspective view of a pivotable embodiment of the semi-automatic device of the present invention, in

Fig. 6, a longitudinal cross-section through the magazine shown in Fig. 4, in

Fig. 7a-7p[7], a schematic representations of method steps "a" to "p" occurring

during the application or removal of plates in accordance with the present invention, in

Fig. 8, a simplified side view[representation] of a beveled-end[off] printing forme, and in

Fig. 9, a schematic representation of a plate end clamping and/or gripping device usable with the present invention.

### **DESCRIPTION OF THE PREFERRED EMBODIMENTS**

[014] Referring to Fig. 1, a[A] printing press, and in particular a web-fed rotary printing press, intended for use in imprinting one or several webs B, has several units 100, 200, 300, 400, 500, 600, 700, 800, 900 for providing[provisioning], imprinting and further processing a web. For example, a[the] web B to be imprinted, and in particular a paper web B, is wound off a roll unwinding device 100 before it is supplied, via a web draw-in unit 200, to one or to several printing units 300. In addition to the depicted printing units 300, which are standardized for multi-color printing, such as, [(]for example, four of them for four-color printing[)], it

is possible to provide additional[further] printing units 300, which<sub>1</sub> in this case<sub>1</sub> can be utilized<sub>1</sub> in alternation with one or with several of the remaining printing units<sub>1</sub> for accomplishing flying printing forme changes, for[fir] example.

**[015]** In an advantageous embodiment<sub>1</sub> a varnishing unit 450 can be provided in the web path.

**[016]** Following imprinting and, if required, varnishing, the web B passes through a dryer 500 and is possibly cooled again in a cooling unit 600<sub>1</sub> if drying is performed thermally. A further conditioning unit such as, for example, a coating device and/or a re-moistening device, which is not specifically represented in Fig. 1, can be provided downstream of the dryer 500 in<sub>1</sub> or downstream of the cooling unit 600. Following cooling and/or conditioning, the web B can be supplied via a superstructure 700 to a folding apparatus 800. The superstructure 700 has at least one silicon unit, one longitudinal cutter and turning device, as well as a hopper unit, which is also not specifically represented in Fig. 1. The [mentioned] silicon unit can also be arranged upstream of the superstructure 700, for example in the area of the cooling unit 600. Furthermore, the superstructure can have, [not

represented in Fig. 1,] a perforating unit, a gluing unit, a numbering unit and/or a plow folder, all of which are not represented in Fig. 1. After passage through the superstructure 700, the web B, or partial webs, are conducted into a folding apparatus 800.

**[017]** In an advantageous embodiment, the printing press also [in addition] has a separate transverse cutter 900, such as, for example, a so-called plano delivery device 900, in which a web B which, for example, had not been conducted through the folding apparatus 800, is cut into standard sheets and, if desired, is stacked or delivered.

**[018]** The units 100, 200, 300, 400, 500, 600, 700, 800, 900 of the printing press have an effective width transversely, in respect to a [the] transport direction T of the web B, which effective width permits processing of webs B of a maximum width "b", as seen in [(Fig. 2)], of, for example, up to 1,000 mm. The [Here, the] effective width is understood to be the respective width, or the clear width, of the structural components, such as, [(for example, the width of the rollers, cylinders, passages, sensor devices, actuating paths, etc.)] of the units 100, 200, 300, 400,



500, 600, 700, 800, 900, which work together with the web B, either directly or indirectly, so that the web B can be processed, conditioned and conveyed in its full width "b". The functionality, such as [(material supply, web transportation, sensor devices, further processing devices)] of the units 100, 200, 300, 400, 500, 600, 700, 800, 900 is configured [designed] in such a way that webs B' of only partial width down to a width "b'" of only 400 mm can be processed in the printing press.

**[019]** The units 100, 200, 300, 400, 500, 600, 700, 800, 900 which define, or process, a section length "a" of web B are configured [designed] in such a way that they define, for example, [they define] a section "a" of a length of between 540 and 700 mm on the web B. The section length "a" advantageously lies between 540 and 630 mm. In a special embodiment of the invention, the section length "a" lies at  $620 \pm 10$  mm. In a further development of the printing press, the units 100, 200, 300, 400, 500, 600, 700, 800, 900 are configured [designed] in such a way that, with a few changes, the printing press can be selectively configured [designed] with section lengths of 546 mm, 578 mm, 590 mm or 620 mm. Thus, for example, substantially only an exchange capability of bearing elements for printing group

cylinders [(see below)], a matching of the drive mechanism [(see below)], as well as matching in the folding apparatus 800 or the transverse cutter 900, all as discussed subsequently [(see below)], are required for accomplishing the change in order to equip the same printing press for formats which differ from each other. For example, in a standard way, the section length "a" is covered by four vertical printed pages, for example DIN A4, positioned side-by-side in the transverse direction of the web B, and two printed pages, [(for example of a length s)], one behind the other in the longitudinal direction. However, depending on the print image and on the subsequent further processing in the superstructure 700 and in the folding apparatus 800, other numbers of pages per section length "a" are also possible.

**[020]** For multi-color imprinting of the web B, B', the printing press has several, such as, for example, at least four, and here in particular five identically equipped printing units 300. The printing units 300 are preferably arranged one next to the other, and a web B, B' passes horizontally through them, as seen in Fig. 1. Each [The] printing unit 300 is preferably configured [designed] as a printing unit 300 for

offset printing, and in particular is configured as a double printing group 300, or as an I-printing group 300, with two printing groups 301, such as, for example, two offset printing groups 301, as seen in Fig. 3, for accomplishing two-sided printing by [means of] the so-called rubber- against-rubber process. Rollers 302 are arranged upstream and downstream at least in the lower area, and optionally in the upper area, of at least one of the printing units 300, by the use [means] of which roller 302 an incoming web B, B' can be conducted around, above or below the printing unit 300, or a web B, B', which has been conducted around an upstream located printing unit 300, can be passed through the printing unit 300, or a web B, B' which has been passed through the printing unit 300 can be conducted around the downstream located printing unit 300.

**[021]** Fig. 3 schematically shows an [the] arrangement of two printing groups 301 which are working together via the web B, B', each with a pair of printing cylinders 303, 304 embodied as a transfer cylinder 303 and a forme cylinder 304, an inking system 305 and a dampening system 306. In an advantageous embodiment, at the [per] forme cylinder 304, the printing unit 300 has devices 307 for semi- or for

fully-automatic plate feeding 401, or for changing of a printing forme 405, as will be described. [(see] below in connection with Fig. 4 and the subsequent figures[et seq.)].

**[022]** In a further embodiment, in particular if the printing press is intended to be suitable for imprinting operations, at least one or several of the printing units 300 have additional guide elements 308 situated closely ahead of<sub>1</sub> and closely behind the nip point of the printing unit 300. If a web B, B' is to pass through the printing unit 300 without being imprinted and without contact between the web B, B' and the transfer cylinders 303, the web guidance, accomplished with the use of the guide elements 308, shown in dashed lines in Fig. 3, is advantageous. The web B, B' passes through the nip point in such a way that it substantially forms an angle of between 80° and 100°, and preferably of approximately 90°, with a connecting line joining [of] the axes of rotation of the two transfer cylinders 303. Preferably<sub>1</sub> the guide elements 308 are provided [designed] as rods or as rollers, around which air flows. This reduces the danger of previously freshly applied ink rubbing off.

[023] In a further development of the represented printing group 301, a washing device 434 is assigned to each transfer cylinder 303. The elastic surface of the transfer cylinder 303 can be cleaned by use[means] of the washing device 434.

[024] Each of the cylinders 303, 304 has a circumference between 540 and 700 mm. The [, wherein preferably the] forme and the transfer cylinder 303, 304 preferably have the same circumference. In an advantageous manner, the circumferences lie[s] between 540 and 630 mm. In a special embodiment, the section length "a" lies at  $620 \pm 10$  mm. In a further development, the printing unit 300 is structured [designed] in such a way that, with a few changes, the cylinders 303, 304 can be selectively provided [designed] with circumferences of 546 mm, 578 mm, 590 mm or 620 mm. Thus, for example, substantially only an exchange of bearing elements or a changed position of the bores in the lateral frame, [(]and the lug[, see below)] for the cylinders 303, 304, and a matching of the drive mechanism or [(]lever[, see below)] takes place, as discussed subsequently.

[025] In addition to [Besides] an ink feeding device, such as, for example, an ink fountain 311 with an actuating device 312, for use regulating the ink flow, the inking system 305 has a plurality of rollers 313 to 325. The ink feeding [-

conducting] device can also be configured [designed] as a doctor blade crosspiece. With the rollers 313 to 325 placed against each other, the ink moves from the ink fountain 311 via the duct roller 313, the film roller 314<sub>1</sub> and a first inking roller 315<sub>1</sub> to a first distribution roller 316. Depending on the mode of operation of the inking system 305, as will be discussed [(see] below[)], from there, the ink moves via at least one inking roller 317 to 320 to at least one further distribution cylinder 321, 324, and from there, via at least one application roller 322, 323, 325<sub>1</sub> to the surface of the forme cylinder 304. In an advantageous embodiment of the inking and dampening systems 305, 306, the second distribution cylinder 324 can also work together with, and at the same time, [with] a roller 328, such as, for example, an application roller 328, of the dampening system 306.

**[026]** The roller 328 works together with a further roller 329 of the dampening system 306, such as, for example, a distribution roller 329, and in particular with a traversing chromium roller 329. The chromium roller 329 receives the dampening agent from a moistening arrangement, for example from a roller 330, and in particular a dipping roller 330, which dipping roller 300 dips into a dampening agent supply 332, such as, for example, a water fountain. A drip pan 335 is preferably arranged underneath the water fountain for use in catching

condensation water forming on the water fountain and which, in an advantageous embodiment, is configured[designed] to be heatable, for example by the use[means] of a heating coil[spiral].

**[027]** In a further development, in addition to[besides] the rollers 313 to 325, the inking system 305 has at least one further roller 326, by the use[means] of which, ink can be taken from the inking system 305 in the ink path, and in particular can be taken upstream of the first distribution cylinder 316. This takes place wherein[in that] an appropriate removal device 333, as seen in [(Fig. 3)], can be placed against this roller 326 itself or, as shown in Fig. 3, against a roller 327 which is working together with roller 326[it].

**[028]** In an advantageous further development of the present invention, in its inlet area, or in the area of its inlet nip between the two transfer cylinders 303, the printing unit 300 has a device 336 for affecting a[the] web fan-out effect, i.e. for affecting a change in the transverse extension/width of the web B, B' as the web travels from one print location to the other, which fan-out effect is caused by the printing process and, [(in particular, is caused by moisture)]. The device 336 is

preferably arranged in the inlet area of a printing unit 300 following the first printing unit 300, i.e. when the web B, B' has been imprinted at least once. Device 336[It] has at least an actuating member, such as, for example, a support element, by the use[means] of which, the web B, B' can be deflected into a direction perpendicularly in respect to the web level, either by contact with the web B, B', or advantageously without contact.

**[029]** As depicted[indicated] in Fig. 3, in an advantageous embodiment of the present invention, the printing group 301 includes[respectively has] a device 401 for use in accomplishing the[ -] at least semi-automatic[ -] changing of a printing forme 405 on the assigned forme cylinder 304. The printing forme changing device 401 is configured[designed] in two parts and has a contact pressure device 402, which is also called a "semi-automatic changer" or a "semi-automatic device" 402, and which is arranged in the area of a nip point between the transfer and forme cylinders 303, 304, and a storage device 403[43], structurally separated from it, such as, for example a magazine 403, with feeding and receiving devices for the printing formes 405, as is depicted in detail in [(]Fig. 4 and the subsequent



drawings [ et. seq.)].

[030] The printing forme 405 extends, [-] regardless of the possible presence of a device 401 for aiding the printing forme change, substantially across the entire width to be imprinted of the web B, B', and substantially [(]except for a joint or a channel opening[)] over the entire circumference of the forme cylinder 304, and has the corresponding dimensions. The semi-automatic plate changer 402, as well as the associated magazine 403, if it is provided, are dimensioned, in the axial extension, for receiving printing formes 405 of a width of a web B, B', which is to be imprinted as a whole.

[031] The printing group 301 has at least one semi-automatic plate or dressing changer 402. In a first embodiment, as seen in Fig. 4, a roller 406 for the semi-automatic changer 402 [(Fig. 4)] is movably arranged, for example is resiliently supported, on a cross beam 404 that is fixed in place on the printing group frame, which roller 406[roll] can be placed into contact with a shell face of a cylinder 304 by [means of ]a drive mechanism 407, or [(]actuating device[means] 407[)], such as, for example a hollow body or [(]hose[)] 407, which can be charged with a

pressure medium, to move roller 406 in the direction of the shell face of the cylinder 304, [(for example against a spring force)], or out of contact, [(for example upon release)]. In addition, a protective device 408, which can also be brought into and out of contact with the surface of cylinder 304, is also seated on the cross beam 404, and rotatable around a rotation point D408, and can be placed into contact with cylinder 304 by [means of ]a drive mechanism 409, or an [(actuating device[means] 409)], for example a hollow body or [(hose)] 409, which can be charged with a pressure medium, to move the device 408 in the direction of the shell face of the cylinder 304, [(for example against a spring force)], or out of contact, [(for example upon release)]. As can be seen in Fig. 5, a plurality, which are shown [(here as ten such)][ of] rollers 406 are seated axially side-by-side, each on respective spring elements 430, in particular spring steel sheets 430. These rollers 406 preferably can [preferably ]be actuated all together or in groups by [means of ]a common drive mechanism 407.

**[032]** In a second embodiment of the semi-automatic changer 402, as seen in [(Fig. 5)], the semi-automatic changer 402, or at least the cross beam 404 with

the roller 406, is not fixed in place, but is arranged in the printing unit frame so as to be[,] pivotable around a pivot axis S402, which is spaced apart from the axis of rotation of the roller 406, but which extends substantially parallel with[in] respect to the axis of rotation of the forme cylinder 304. A drive mechanism 431, such as, for example, a cylinder 431 which can be charged with a pressure medium, is provided for the pivot movement and is, for example, hinged with one end on the lateral printing unit frame, which is not specifically represented, and with the other end on the semi-automatic changer 402, such as, [(for example, in engagement with the cross beam 404, or with a lever arm connected therewith)] eccentrically in respect to the pivot axis S402. The pivotable cross beam 404, or the semi-automatic changer 402, can be pivotably seated directly on the lateral frame or, as is represented in Fig. 5, can be supported by [means of ]a holder 432 that is appropriately connected with the lateral frame. Advantageously, the holder 432 can be seated on the lateral frame, or on a bearing block 435 which is arranged on the lateral frame, and which is adjustable in a direction that is perpendicularly with[in] relation to the pivot axis S402.

[033] The movement of the roller 406 into and out of contact with the cylinder 304 can take place<sub>1</sub> in the manner of the first embodiment<sub>1</sub> by the[means of a] drive mechanism 407, such as, for example a hollow body 407 which can be charged with a pressure medium, and by a spring force, if desired<sub>1</sub> in an embodiment with an additional protective device 408.

[034] In an alternative solution, the pivot axis S402 has been selected in such a way that the roller 406, which is fixedly, but is also, if desired<sub>1</sub> resiliently seated, can be brought into or out of contact by pivoting the cross beam 404 alone. In that case<sub>1</sub> an additional drive mechanism[ driving of] the roller 406, such as the [(]drive mechanisms 407[)] can be omitted.

[035] It is possible<sub>1</sub> in principle<sub>1</sub> to attach a printing plate 405 in a semi-automatic manner by use[means] of the described semi-automatic changer 402<sub>1</sub> [-] in either a[the] first or a[the] second embodiment[ -]. To this end, in the first embodiment a printing forme 405 to be drawn-on is manually introduced into the space between the roller 406 and the forme cylinder 304 and initially remains there loosely clamped in place. Thereafter<sub>1</sub> the roller 406[403] is brought into contact

with forme 405, [it] and the cylinder 304 is rotated [(here] in a clockwise direction[]],  
as seen in Fig. 4. The leading end of the printing forme 405, which is angled or  
[(]beveled by 40° to 50°, and in particular by an intermediate angle  $\alpha$  of  
approximately 45°, as seen in [see ]Fig. 8[]], snaps into an opening 411, as seen  
in [(see ]Figs. 4 and 9[]], of a clamping and/or gripping channel, which channel  
extends axially in the forme cylinder 304 over at least the usable width. The[; the]  
printing forme 405 is now wound around the cylinder 304 by rotating the latter until  
the forme trailing edge, which is beveled, in particular by an intermediate angle  $\beta$   
of approximately 90°, is also pushed into the channel by the roller 406. Thereafter,  
a possibly provided, schematically depicted plate end[symbolically indicated]  
arresting, clamping and/or gripping device 410 is activated. For [ (for] details  
regarding the clamping and/or gripping device 410 see Fig. 9[]]. Plate removal  
takes place accordingly in the reverse sequence, the pushed-out printing forme  
405 can be manually removed from the space between the roller 406 and the  
cylinder 304. In the area of the shell face of the cylinder 304, the opening 411 to  
the channel preferably has a width of from 1 to 5 mm in the circumferential

direction of the cylinder 304, and in particular has a width less than, or equal to 3 mm. The clamping device 410 is advantageously pneumatically operable, and may be, for example, embodied in the form of one or of several pneumatically actuable levers 442, as seen in Fig. 9, which, in the closed state, are prestressed against the plate or forme trailing end 441 which is [(for example, beveled by approximately 90°)] and which is extending into the channel. Preferably, a hose 444, as also seen in [(Fig. 9)], which can be charged with a pressure medium, can be used as the actuating device[means] 444. The hose 444 is supplied with a pressure medium through a feed tube or conduit 445. A channel wall, which acting together with the plate or forme leading end 439, forms a nose-shaped intermediate angle  $\alpha'$  with the shell face of the cylinder 303 or 304, which substantially angle  $\alpha'$  corresponds to the one of the bevel of the plate or forme leading end 439. The same applies to the intermediate angle  $\beta'$  in the area of the opposite wall and to the angle  $\beta$  of approximately 90° of the plate or forme beveled trailing end 441.

**[036]** In connection with the second embodiment, the attachment or the

removal of the plate or forme 405 takes place, in principle, in the same steps, however, at the time during removal in which the leading end 439 is to snap out of the channel of the clamping device 410, the semi-automatic device 402 is, in the meantime, moved from its normal position into the end position, where it is farther removed from the cylinder 304.

**[037]** However, in a preferred embodiment, the feeding or the removal of the printing forme 405 takes place automatically by the use[means] of the magazine or storage device 403, which magazine or storage device 403 is structurally separate from the semi-automatic changer 402. The second embodiment of the semi-automatic changer[device] 402 is preferably employed in connection with the second embodiment of the magazine 403, which is described below. The first embodiment of the magazine 403 is advantageous for use with the first embodiment of the semi-automatic changer[device] 402. As can be seen in Fig. 4, in this first embodiment, the magazine 403 is seated, pivotable around a pivot point D403 with[in] respect to the lateral frame.

**[038]** In a first embodiment the magazine 403, a roller 412, which is pivotable

around a pivot axis that is extending parallel with the cylinder axis, is seated on the magazine 403, where it can be driven by a drive mechanism 413. In the course of the drawing-on of a fresh printing forme[form] 405, the roller 412 is used for bending the printing forme 405 in such a way that a prestress of the printing forme leading end 439 against the shell face of the cylinder 304 results.

**[039]** In a second embodiment, [of ]the magazine 403, however, [it ]does not have the above mentioned roller 412 and the drive mechanism 413, which second embodiment is [(not explicitly represented)]. For this reason, the magazine 403, in accordance with the first embodiment, is represented with the roller 412 and with the drive mechanism 413, wherein the subsequent description, aside from the description of the roller 412 and of the drive mechanism 413, is to be applied to the first, as well as the second embodiment of the magazine.

**[040]** On a side of the magazine 403 which is facing the nip point of the two cylinders 303, 304, a flap 414 is seated, so as to be movable, for example, around a pivot axis that is extending parallel with the cylinder axis. Flap 414[, and] is advantageously driven by a drive mechanism 416, such as, for example, a cylinder



which can be charged with a pressure medium. The flap 414[41] is used for opening or for closing a chute 417, which is more visible in Fig. 6, and which may be, for example, a feeding chute 417 for receipt of printing formes 405 to be freshly attached to cylinder 304. With the feeding chute 417 closed, as depicted in dashed lines in Fig. 6, the path to the nip point is blocked thereby preventing passage off[for] a [freshly] to be attached printing forme 405 which has been inserted in the feeding chute. A[, and the] path for receipt and travel of a printing forme 405 to be removed, [-] in the first embodiment past the roller 412, [-] in a chute 418, which may be, for example, a plate or forme[ the] receiving chute 418, is free in [(]both positions of the flap 914, as indicated in Fig. 6[)]. For transporting the printing formes 405 in the chutes 417 and 418 of the magazine 403, there is provided a transport assembly[means] 419, for example a carriage 419, which is arranged in the interior of the magazine 403 and which is movable in a longitudinal direction with[in] relation to the chutes 417, 418. Carriage 419[It] has a first holding device[means] 421, such as, for example, a clamping device 421, on a side working together with the printing forme 405 to be freshly applied, and a

second holding device[means] 422, for example a clamping device 422, on the side working together with the printing forme 405 to be removed. Here, the carriage 419 is constructed[designed] in one piece or [(]possibly consisting of several connected pieces[)], and is intended to serve both chutes 417, 418, wherein the carriage 419 encloses at least the one chute 418, forming a passage, or a passage opening 425, for the removed printing formes 405. The carriage 419 preferably extends along[around] both chutes 417, 418, wherein the respective clamping device 421, 422 is provided on one chute side, and the opposite side of the carriage passage is used as a counter-support. For example, the clamping devices 421, 422 are configured[designed] as hollow bodies or cylinders, which can be actuated by a pressure medium and which are embodied either to be actively clamping, or to be self-locking, such as, [(]for example by operating against a spring mechanism[)].

**[041]** A feeler or sensor 420 is preferably arranged in the area of the flap 414 in such a way that it registers the position of a fresh printing forme 405 in the plate feeding chute 417 when the flap 414 is closed, so that in this way a correct

position of the fresh printing forme 405 is assured. Preferably the feeler or sensor 420 is configured[designed] as an inductive feeler or sensor 420.

**[042]** The plate or forme transport assembly or carriage 419, which supports the clamping devices 421, 422 and, if required, brushes 423[413], is driven by a drive mechanism 424, for example an electric motor 424. This takes place, for example, by the use[means] of a belt drive 426. In principle, the carriage 419 can also be driven by [means of ]a drive mechanism 424, which is configured[designed] as a cylinder, and which can be operated by a pressure medium. A rear end section 427 of carriage 419, which is facing away from the cylinder 304, is preferably configured[designed] to be open, at least in the area of the chutes 417 and 418. In this way, printing formes 405 of different formats for printing presses, also of different formats, can be handled with one[in spite of the identical structure of the] magazine 403 whose size will accommodate these different formats. One, or several further holding devices[means] 428, 429, such as, for example, clamping devices 428, 429 for each[, per] chute 417, 418 can be advantageously provided in the end area 427, which clamping devices cooperate

to maintain the respective printing formes 405 in a prepared storage position; i.e.

[([)prior to attachment or following removal()], in the magazine 403. Such a holding

device or structure[means] 428, which is fixed in place with[in] respect to the

storage device 403, should be provided for at least one of the chutes 417, 418,

and in particular should be provided for the receiving chute 418. The clamping

devices 428, 429 are fixed on the frame of the magazine 403, while the above

mentioned clamping devices 421, 422 are assigned to the movable carriage 419

and are connected with it.

**[043]** The holding or clamping devices[means] 421, 422, 428, 429 can also be

constructed[designed] differently than what is represented so that[wherein,

however,] preferably all, but at least the holding means 421, 422, which are

assigned to the carriage 419, are configured[designed] as connections which are

effective on both sides. If desired, this connection can be, in addition to[besides]

the frictional connection represented, also be a positively connected connection,

that is effective on both sides. A[Here, a] connection which is recited as being

effective on both sides should be understood to be a connection which can be

stressed for tension and for traction with[in] regard to the conveying direction in the longitudinal direction of the chute.

**[044]** The actions, or the method steps in the magazine 403 during removal or installation are schematically represented in the accompanying[following] Figs. 7a to 7p of the drawings. For reasons of clarity, the reference numerals will be used only in the first figures. In the representations in Fig. 7, the chutes 417 and 418 with the associated clamping devices 421, 422, 428, 429 are reversed by way of example with[in] respect to the representation in Fig. 6. Although it is possible, in principle, to configure the magazine 403 with[design] the feeding chute 417 to be always at the top and with the receiving chute 418 always at the bottom, or vice versa, it is practical for the feeding chute 417 to be arranged on the side of the magazine 403 closer to the web B, B', so that with an upper printing group 301 the feeding chute 417 is arranged to lie on the bottom, and with a lower printing group 301 the feeding chute 471 is arranged to lie on the top.

**[045]** Fig. 7a shows the magazine 403 in the initial position, i.e. one in which there is no printing forme 405 in either one of the chutes 417, 418, and wherein

the clamping devices 421, 422, 428, 429 are disengaged, so that [ i.e.] they release the respective chutes 417, 418 and are, for example, in a position of rest.

Furthermore, the flap 414 is in a position in which the feeding chute 417 is closed and the receiving chute 418 is open. The carriage 419 is in a rear position, which is its position of rest. Now, a printing forme 405 is introduced into the feeding chute 417, as seen in [(Fig. 7b)], until it comes to rest, for example, against a stop 415, and is subsequently secured by the clamping device 429 which is fixed on the frame, as shown in [(Fig. 7c)]. Forme securement[Securing] can take place either automatically or under the condition that a feeler or a sensor 420 recognizing the leading edge, [(for example in the area of the stop 415, but only represented in Fig. 7d)], registers the correctly positioned fresh printing plate 405. Now, the magazine 403 is ready for a possibly subsequent placement of forme or plate 405 on an "empty" cylinder 304, which would be continued with the clamping of the fresh printing plate 405 in accordance with Fig. 7i, [(but without an accompanying releasing of an old printing plate 405 from the carriage 419).

**[046]** However, if a plate change is to be performed, or only if an old printing

plate 405 is to be removed from the cylinder 304, the steps to be discussed in accordance with Fig. 7d, inclusive of Fig. 7h, are required, possibly with the step for releasing the old printing plate 405 from the carriage 419, as depicted in Fig. 7i.

**[047]** It is not shown<sub>1</sub> in Fig. 7d<sub>1</sub> that for plate removal, initially[ first] the roller 406 represented in Figs. 4 and 5 is placed by the drive mechanism 407 against the printing plate 405 which is still located on the cylinder 304. Subsequently[, and subsequently] the possibly provided arresting, clamping or gripping device 410 for the trailing end of the printing plate 405 is released, so that<sub>1</sub> in the course of rotating the cylinder 304 in the direction opposite to the production direction, the end of the plate 405 can escape from the channel. The printing plate 405 is now released by the rotation of the cylinder 304, and is guided by the roller 406, or<sub>1</sub> at this point, is still pressed against the shell face by it, and is released, step by step<sub>1</sub> from the cylinder 304 because of the plate or forme[its] inherent tension, and is pushed into the receiving chute 418 by the rotation of the cylinder 304 (Fig. 7d). During this[In the] process<sub>1</sub> the two clamping devices 422, 428, which are assigned to the receiving chute 418<sub>1</sub> are inactive.

**[048]** The carriage 419 is [either ]already either in a position close to the cylinder or, as represented in Fig. 7e in comparison with Fig. 7d, can be moved there. In a phase in which the printing forme 405 has been unwound to a large degree, and the leading end 439 of forme 405 is almost or is already underneath the roller 406, the roller 406 is moved away from the cylinder 304 so that, following the release of the clamping device 410 and the further rotation of the cylinder 304, that the leading end 439 of the forme 405 can spring out of the channel.

**[049]** To simplify[For simplifying] the release of the leading end 439 of the printing plate 405 from the channel of the arresting, clamping or gripping device 410, as seen in Fig. 9, in an advantageous method step, the printing plate 405 is bent in a suitable manner in an end phase of its unwinding in a first variation by pivoting of the roller 412 in accordance with Fig. 4. In this way, the leading end 439 of the plate 405 is provided with a torque because of the bending of the printing plate 405 in order to be able to escape, in a simpler way, from the channel in the course of the further rotation of the cylinder 304. As represented, by way of example in Fig. 7f, bending can also take place by resetting the flap 414, in which



case a roller 412 and its drive mechanism 413, which otherwise, to be especially provided<sub>1</sub> can be omitted.

**[050]** In another variation of the invention, the semi-automatic device 404, which<sub>1</sub> in accordance with Fig. 5<sub>1</sub> is pivotable, is<sub>1</sub> in this state<sub>1</sub> moved into a position so that the roller 406, whose [(~~)drive mechanism 407~~ has been deactivated[~~)]~~, and which had already been disengaged shortly before this, is even further removed from the cylinder 304. In this way<sub>1</sub> the leading end 439 of the forme or plate 405 is provided with sufficient space for escaping more easily from the channel<sub>1</sub> in the course of further rotation of the cylinder 304.

**[051]** If [now ]the leading end 439 of the printing plate 405 has also been removed from the channel of the arresting device, the printing plate 405 can no longer be conveyed by continued rotation of[rotating] the cylinder 304. As represented in Fig. 7f, the printing plate 405 to be removed is now clamped by the clamping device 422 of the carriage 419, which carriage 419 is in the forward position, and the printing plate 405 is pulled completely into the receiving chute 418 of the magazine 403 by moving the carriage 419 into a rear or retracted

position, as seen in [(Fig. 7g)].

[052] After releasing the front edge 439 of the plate 405 from the channel of the arresting device, the roller 412 of the one variation of the plate changer, or the pivotable semi-automatic device 402 of the other variation of the plate changer, can be returned into its normal position.

[053] By the[means of] subsequent clamping of the printing plate 405, by use[means] of the clamping device 428 fixed on the frame, the plate 405[ it] is secured in a parked position until its removal by either the operators of the press or by use of a device provided for this, as seen in [(Fig. 7h, It)], it is thereafter possible, as can be seen in Fig. 7i, to release the clamping device 422, which is assigned to the carriage 419. With this release, the step of releasing an "old" printing plate is finished, except for removal of the "old" printing plate from the chute 418. To remove[For removing] the old printing plate 405, at this, or at a later time, it is merely necessary to release the clamping device 428 and to remove the printing plate 405 through the preferably open rear end 427 of the magazine 403.

[054] In the case of attaching plates during a plate change, or in the use of a

fresh printing plate 405 at the start of production, the steps described below are intended to follow the previously-[above] mentioned steps in Figs. 7a to 7c. The fresh printing plate 405 is clamped to the carriage 419, which carriage 419 is in its rear or retracted position, as shown in [(Fig. 7i, second part)], by use[means] of the clamping device 421 that is assigned to the carriage 419 in the area of the feeding chute 417. Clamping, and thereupon clamping] is now released by [means of ]the clamping device 429, which is fixed on the frame, as shown in [(Fig. 7k)]. If the flap 414 is still [is ]in the position in which it closes the feeding chute 417, flap 414[it] is opened by actuating the drive mechanism 416. By moving the carriage 419 into a forward position, or to the left in Fig. 7L, the fresh printing plate 405 is moved out of the chute 417 to the cylinder 304[(Fig. 7l)]. By activating the drive mechanism 407, the roller 406 is placed against the cylinder 304 before the printing plate 405 reaches the[its] shell face of cylinder 304. The roller 406 is used as a stop for the leading end 439 of the printing forme 405. In, in] the course of this, the roller 406 now[which it] rotates, together with the cylinder 304, which is now turning in the production direction by [means of ]friction, in such

a way that the leading end 439 of plate 405 experiences a force in the direction of the shell face of the cylinder because of friction at the roller surface. When, because of the continued rotation of the cylinder 304, the channel of the clamping and/or gripping device 410 passes underneath the leading end 439 of the printing plate 405 touching the roller 406, the plate leading end 439 is pushed into the channel, as aided by the roller 406 and its rotating movement. Preferably, the plate 405 is not released by the clamping device 421 of the magazine 403 immediately after its[the] leading end snaps in, but is, as shown in Fig. 7m, still held by the clamping device 421 until it has been partially drawn onto the shell surface of the cylinder 304[on].

**[055]** While the printing plate 405 is being further drawn on to cylinder 304 by the rotation of the cylinder 304, the clamping of the plate 405 by the clamping device 421 of the carriage 419 is released, as seen in [(Fig. 7n)]. The roller 406 of the plate changer 402 remains placed against the printing plate 405 during the entire process of drawing it on, and finally pushes the printing plate trailing end 441 into the channel. Following arresting of the plate end in the channel, the roller

406 is brought out of contact, i.e. the pressure medium 407 is deactivated. After the release of the clamping device 421 of the magazine 403, the carriage 419 is preferably moved back into its position of rest, i.e. its rear position, as shown in Fig. 7o. As previously[already] mentioned[ above], in case of a plate change, it is now possible to remove the old printing plate 405, after the clamping device 428 has been released, as seen in Fig. 7p. Now, both chutes 417, 418 are empty, and the carriage 419 is in its initial position. To this end, the flap 414 is now placed into the position, if required, in which the receiving chute 418 is opened for receipt of a printing plate 405 to be installed.

**[056]** On its circumference, the transfer cylinder 303 has at least one dressing 436, as depicted[indicated] in Fig. 4, which dressing 436 is maintained in at least one channel which is extending axially on the shell face of cylinder 303. The transfer cylinder 303 preferably has only one dressing 436 extending over the effective length, or substantially over the entire width of the web B, B' to be imprinted, and substantially extending, [(except for a joint, or a channel opening)], over the entire circumference of the transfer cylinder 303. Preferably, the dressing

436 is constructed[designed] as a so-called metal printing blanket 436, which has an elastic layer of, [(]for example, rubber[)], supported on a substantially dimensionally stable support layer, such as, for example, a thin metal plate. The ends of this dressing 436 are passed through an opening 437 in the transfer cylinder's shell face into the channel and are maintained there in a frictionally connected way or in a positively connected way. In the case of a metal printing blanket 436, the ends are bent/beveled off, [(]for example in the area of the blanket's[its] leading end by approximately 45°, and in the area of the blanket's[its] trailing end by approximately 135°, or by an intermediate angle of 45°[)]. These ends extend through the opening 437 of a channel that is extending axially over the entire useful width of the transfer cylinder 303, and which channel also has, for example, an arresting device 438, such as a clamping and/or gripping device 438, and in particular a device 438 corresponding substantially to the clamping device 410, as represented in Fig. 9 in connection with[of] the forme cylinder 304.

However, in the representation of Figs. 8 and 9, the printing forme 410 corresponds, for example, to the dimensionally stable support layer of the dressing

436 and is embodied as a metal printing blanket 436 wherein, however, an elastic layer on the effective outer surface is not represented in Fig. 9. In the area of the shell face, the opening 437 to the channel preferably has a width<sub>1</sub> in the circumferential direction of the cylinder 304<sub>1</sub> of preferably 1 to 5 mm, and in particular to less than or equal to 3 mm. The clamping device 438 is preferably pneumatically operable, and may be embodied, for example<sub>1</sub>[ embodied] in the form of one or several pneumatically actuable levers 442 which, in their[ the] closed position are prestressed by [means of ]a spring force which is applied against the trailing end that is extending into the channel. A hose 444, which can be charged with a pressure medium, can preferably be employed as the actuating member[means] 444.

**[057]** The transfer cylinder 303 preferably has a single dressing 436, which is embodied as a printing blanket 436 and which<sub>1</sub>[ -] regardless of the possible presence of a washing device 434 or the special construction[design] of a clamping device 438<sub>1</sub>[ -] substantially extends over the entire width of the web B, B' to be imprinted, and substantially<sub>1</sub> [(]except for a joint or a channel opening[)],

over the entire circumference of the transfer cylinder 303, and which has the corresponding dimensions.

[058] While preferred embodiments of a device and methods for drawing in or removing a printing forme from a forme cylinder of a printing unit in accordance with the present invention have been set forth fully and completely hereinabove, it will be apparent to one of skill in the art that various changes in, for example the specific web being printed, the drive assemblies for the various cylinders, and the like could be made without departing from the true spirit and scope of the present invention which is accordingly to be limited only by the appended claims.

WHAT IS CLAIMED IS:



## [List of Reference Symbols]

- 100 Unit, roll unwinding device, roll changer
- 200 Unit, draw-in unit
- 300 Unit, printing unit, double-printing group, l-  
printing group
- 301 Printing group, offset printing group
- 302 Roller,
- 303 Cylinder, printing group cylinder, transfer  
cylinder
- 304 Cylinder, printing group cylinder, forme  
cylinder
- 305 Inking system
- 306 Dampening system
- 307 -
- 308 Guide element
- 309 -
- 310 -
- 311 Ink fountain
- 312 Actuating device
- 313 Roller, duct roller
- 314 Roller, film roller
- 315 Roller, inking roller
- 316 Roller, distribution cylinder
- 317 Roller, inking roller
- 318 Roller, inking roller
- 319 Roller, inking roller
- 320 Roller, inking roller
- 321 Roller, distribution cylinder
- 322 Roller, application roller]

- [323 Roller, application roller
- 324 Roller, distribution roller
- 325 Roller, application roller
- 326 Roller
- 327 Roller
- 328 Roller, application roller
- 329 Roller, distribution roller, chromium roller
- 330 Roller, dipping roller
- 331 -
- 332 Dampening agent supply
- 333 Removal device
- 334 -
- 335 Drip plate
- 336 Device for affecting the fan-out effect
- 400 Unit, varnishing unit
- 401 Device for the semi- or fully automatic plate  
guidance
- 402 Contact pressure device, semi-automatic  
changer, semi-automatic device
- 403 Storage device, magazine
- 404 Cross beam
- 405 Printing forme, printing plate
- 406 Roller
- 407 Drive mechanism, actuating means, hollow body,  
hose
- 408 Protective device
- 409 Drive mechanism, hollow body, hose
- 410 Clamping and/or gripping device
- 411 Opening
- 412 Roller
- 413 Drive mechanism
- 414 Flap]

- [415 Stop
- 416 Drive mechanism
- 417 Chute, feeding chute
- 418 Chute, receiving chute
- 419 Transport means, carriage
- 420 Feeler
- 421 Holding means, clamping device
- 422 Holding means, clamping device
- 423 Brush
- 424 Drive mechanism, electric motor
- 425 Passage, passage opening
- 426 Belt drive
- 427 End area
- 428 Holding means, clamping device
- 429 Holding means, clamping device
- 430 Spring element, spring steel sheet
- 431 Drive mechanism, cylinder
- 432 Holder
- 433 -
- 434 Washing device
- 435 Bearing block
- 436 Dressing, metal printing blanket, printing  
blanket
- 437 Opening
- 438 Arresting device, clamping and/or gripping  
device
- 439 End, leading
- 440 -
- 441 End, trailing
- 442 Lever
- 443 Spring
- 444 Actuating means, hose]

[445    Feed  
500    Unit, dryer  
600    Unit, cooling unit  
700    Unit, superstructure  
800    Unit, folding apparatus  
900    Unit, transverse cutter, plano delivery device

a    Section length  
s    Length

b    Width (B)  
b'   Width (B')

B    Web, paper web  
B'   Web, paper web

T    Transport direction

D403   Pivot point  
D408   Rotating point

alpha   Intermediate angle  
beta    Intermediate angle

$\alpha'$    Intermediate angle  
 $\beta'$    Intermediate angle]